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Research Article

Evaluation of Advanced Entries/ Varieties of Finger Millet in Tripura

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Abstract

Eleusine coracana, commonly known as finger millet or ragi in India, ranks sixth among grains, behind rice, bajra, sorghum, wheat and maize. After foxtail millet, sorghum and pearl millet, it is regarded as the most significant millet in the world. Consumed in significant amounts in the region, millet flour has been attributed the highest nutritional quality among coarser cereals. They are also an abundant source of dietary fibres (18%), calcium (344 mg per 100 g), polyphenols (0.3-3%) and bioactive compounds such as tannin (0.04-3.47), phyate (0.48%), oxalate (0.27%), cyanide (0.17%) and saponin (0.36%). Also, it supplies necessary amino acids (methionine, leucine, phenylalanine and isoleucine), minerals (iron, phosphorus and calcium) and vitamins, including B-complex (1.71 mg) and E (22 mg). Finger millet seems to be the most crucial small millet in India, both because of its ability to tolerate low water availability (rainfall <500 mm annum^{-1}) and its dual use as food and fodder. It is one of the small millets that have high nutritional quality with proteins (6-13%), minerals (2.5-3.5%) such as thiamine and riboflavin among other important nutrients. Although there is limited research on finger millet in Tripura, agro-climatic conditions are suitable for this crop.

To explore its potential, an advanced varietal trial was conducted in a randomized block design (RBD) with 3 replications, evaluating 10 entries: BR-14-3, KOPN 942, VL 387, VR 1101, OEB 602, GPU 45, VL 352, GPU 67 and PR 202. Among these, KOPN 942 exhibited superior performance with the highest plant height (103.89 cm), maximum number of effective tillers (5.63), dry fodder yield (19 kg ha^{-1}) and grain yield (2,080 kg ha^{-1}). Based on these findings, KOPN 942 is recommended for adoption by farmers to enhance cropping systems and productivity.

Keywords: Advanced varieties, *Eleusine coracana*, Finger millet, KOPN 942, Productivity, Tripura

Introduction

Millet is a cereal grain, shaped as tiny and spherical that belongs to the Poaceae grass family. This grain is widely cultivated in India and Nigeria, with significant prominence in Asia and Africa. Super-grain, super-food and marvel grain are a portion of the descriptive words frequently used to depict millet, one of the most seasoned food varieties known to people and likely the principal grain utilized for home-grown purposes. Millets are significant cereals which assume a huge part in the food and sustenance security of non-industrial nations in the semi-dry jungles of Asia and Africa, particularly in India, Nigeria and Niger. There are various sorts of millets. Some of the common varieties of millets are finger millet, foxtail millet, pearl millet, proso millet, little millet and sorghum. Nutritionally, millets are of high value content with respect to protein, dietary fiber, minerals, iron and calcium. Further, it also has low glycemic index values and hence beneficial for diabetic management. The Public Year of Millets was commended in 2018. To spur home-grown and worldwide interest and to give wholesome food to individuals, the Public Authority of India proposed to joined countries for proclaiming 2023 as the Global Year of Millets (IYoM). The proposition of India was upheld by 72 nations and United Nations General Assembly (UNGA) announced 2023 as the International Year of Millets in March

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month of 2021.

In Nepal, finger millet (*Eleusine coracana*) or ragi, is referred to as kodo. This herbaceous annual plant is mostly cultivated in arid and semi-arid regions of Asia and Africa as a cereal crop. Being self-pollinated and tetraploid, it completes its lifecycle under short-day conditions; most varieties do well with less than 12 hours of daylight. The major production areas for this crop are situated between 20° N and 20° S latitude in the tropical climatic zone having arid to semi-arid conditions.

Although finger millet is generally acclaimed as a drought-tolerant crop, it performs relatively better under rainfall conditions comparing to other millets; for example, pearl millet and sorghum. Normally, the global production of finger millet is done under rainfed conditions. However, the yield can be improved significantly with supplementary irrigation. In India, it is commonly grown as a *rabi* crop during the dry winter season. The crop demonstrates high heat tolerance, enabling it to adapt to varying climatic conditions.

Finger millet grows best in well-drained soils having stable moisture levels, while it can endure a variety of soil types, including heavily weathered tropical lateritic soils. It has moderate tolerance to soil salinity and can grow in slightly acidic soils (pH 5) as well as moderately alkaline soils (pH 8.2). Nevertheless, it is sensitive to water-logging, necessitating soils with good drainage and moderate water-holding capacity for favourable growth.

Tripura situated in the North Eastern part of India, ranked third as the smallest state of the country; while the state has assorted scope of geography, individuals, vegetation. As such no significant data is tracked down about development of finger millet in Tripura yet its climatic condition is appropriate for cultivation. The low yielding hereditary capability of the generally developed local cultivar, as well as the utilization of customary agronomic practices, are the primary production constraints. Hence, this study was intended to assess ten finger millet passages for their endlessly yield related characteristics under upland areas of Tripura. Thus the objective of the study is to assess the suitable advance entries or varieties of finger millet in Tripura.

Materials and Methods

Experimental Site

An on-field investigation was carried out at the experimental farm of the College of Agriculture Tripura, Lembucherra, India (23°56′ N lat. and 91°10′ E long., 160 msl) in 2018, in collaboration with the Plant Breeding Division, SARS, AD Nagar, Agartala, under the AICRP on Small Millets, GKVK, Bengaluru. The area experiences an average annual precipitation of 2100 mm, with approximately 80% of it occurring during the monsoon season. The soil at the experimental site is characterized as sandy loam and is classified under the *Typic Kandihumults* soil group.

Soil

The experimental field soil, classified as *Typic Kandihumults*, is sandy loam in texture. 6.4 g kg^{-1} soil organic carbon (SOC), 270.0 mg kg^{-1} available nitrogen (N), 8.5 mg kg^{-1} available phosphorus (P) and 265.5 mg kg^{-1} available potassium (K) were found in the baseline soil sample analysis. With a soil-to-water ratio of 1:2.6, the soil's pH of 5.2, indicating an acidic nature (Giri *et al.*, 2021).

Treatment Details

Varietal trail was conducted with 10 different entries BR-14-3, KOPN-942, VL-387, VR-1101, OEB-602, GPU-45, VL-352, GPU-67 and PR-202 of finger millet in a RBD (Randomised Block Design) design and replicated thrice.

Statistical Analysis

The analysis of variance (ANOVA) method was employed to statistically analyse the trial data related to each review parameter and the "F" test was used to assess the significance of the results, as described by Gomez and Gomez (1984). To evaluate the differences between treatment means, the critical difference (CD) and standard error of means (SEm±) were computed for each parameter at a 5% probability level (p=0.05).

Results and Discussion

Crop Ontogeny

On August 1st, 2018, the finger millet entries were sowed and they germinated within 4-5 days. It took 75-88 days of the finger millet entries for 50% flowering (Table 1). The variety VL-352 required the fewest days (58 DAS) to initiate flowers among the lines and varieties, while the corresponding varieties required the fewest days (75-88 DAS) to reach 50% flowering stage. However, KOPN-942 required the most days for 50% flowering and flower initiation (88 DAS), followed by GPU-67 (85 DAS). In case of days to maturity, KOPN-942 and VL-387 were the late matured varieties (requiring 111 days to develop), while VL-352 and BR-14-3 demonstrated early maturation at 87 and 89 days to maturity, respectively. Similar results were observed by Banarjee and Mondal (2023).

Table 1: Flowering and maturity period of various finger millets varieties

Treatment	Days to 50% flowering	Days to Maturity
VL 352	58.0	87.0
BR-14-3	69.0	89.0
VR 1101	80.0	95.0
PR 202	82.0	98.0
GPU 45	80.0	95.0
KOPN 942	88.0	111.0
OEB 602	75.0	90.0
VL 387	75.0	90.0
GPU 67	85.0	111.0
Local	82.0	98.0
SEm (±)	7.27	9.38
CD at 5%	21.61	27.87

Growth Attributes

Plant height at harvest was maximum (116.91 cm) for OEB 602 closely followed by VL 352 (113.33 cm); whereas, lowest plant height (79.61 cm) was recorded by VL 387 variety. No. of effective tillers were recorded highest in PR 202 (5.83) followed by KOPN 942 (5.63) whereas lowest no. of effective tillers were recorded in local check variety. Dry fodder yield was highest in GPU 45 (25.15 kg ha^{-1}) followed by PR 202 (20.50 kg ha^{-1}) and lowest was recorded by VL 387 (3.18 kg ha^{-1}). Banarjee and Mondal (2023) recorded similar type of result.

Seed Yield

In comparison to the other varieties/lines, KOPN 942 had the highest seed output (2,080 kg ha^{-1}), followed by PR 202 (2,119.47 kg ha^{-1}). Better photosynthetic translocation to the sink and its favourable impact on yield metrics, such as the number of pods $plant^{-1}$ and the number of seeds pod^{-1}, may be the primary cause of this observation (Table 2).

Table 2: Yield characteristics and performance of various finger millet entries

Treatment	Plant height at harvest (cm)	No. of effective tillers	Dry fodder yield	Seed yield (kg ha^{-1})
VL 352	113.33	4.93	7.09	1045
BR-14-3	104.68	3.95	5.28	1277
VR 1101	99.15	3.40	18.10	722
PR 202	111.42	5.83	20.50	2119
GPU 45	104.52	5.07	25.15	1545
KOPN 942	103.89	5.63	19.00	2080
OEB 602	116.91	4.07	6.21	1164
VL 387	79.61	3.07	3.18	454
GPU 67	103.00	2.73	5.09	615
Local	99.05	2.07	10.49	173
SEm (±)	6.47	0.53	1.28	105
CD at 5%	19.21	1.59	3.81	313

Conclusion

From the exploratory review, it tends to be reasoned that there is an extension for development of various assortments of finger millet in upland condition of Tripura. The KOPN 942 variety not just had higher plant stand at harvesting time in Tripura conditions, yet in addition had higher development and yield credits, which fundamentally added to its palatable seed yield in Tripura's upland circumstances for sustainable agriculture. Be that as it may, more variety/lines from various institutes ought to be tried to recognize short duration and high yielding varieties that are suitable for this state.

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